

# **DACeco**

## **operating manual**



Dürkopp Adler AG, PO Box 17 03 51, D-33703 Bielefeld, Potsdamerstr. 190, D-33719 Bielefeld  
Phone +49 (0) 521 9 25 00, Fax +49 (0) 521 9 25 24 35, [www.duerkopp-adler.com](http://www.duerkopp-adler.com)

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# **DACeco**

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## 1 Important safety instructions

This DAC<sub>eco</sub> sewing machine drive is manufactured and tested in accordance with the applicable conditions and safety regulations and left the factory in a perfectly safe condition.

The user must observe all instructions and warning notices contained in these operating instructions in order to maintain this condition and guarantee safe operation.

Any other use or use exceeding that specified, e.g. in the open air, in a wet or hazardous explosive environment, is not regarded as intended use.. Use for the intended purpose includes observing the manufacturer's prescribed conditions for operation, maintenance and repair.

The DAC<sub>eco</sub> will only work safely and reliably if the control unit is used in accordance with these operating instructions and its intended use.

Read these operating instructions carefully before unpacking and commissioning the DAC<sub>eco</sub>. Familiarise yourself with the safety, assembly, operating and maintenance instructions before using the DAC<sub>eco</sub>, its accessories and its additional attachments for the first time.

All operations on and with the DAC<sub>eco</sub> must only be carried out in compliance with the following general and particular safety instructions in the following sections of the operating instructions.

All persons affected by this must be made aware of these safety instructions and must comply with them. Non-compliance with the safety instructions may lead to personal injury, damage to equipment or malfunctions of and damage to the drive itself.

The applicable accident prevention regulations in the respective user's country and the rules for safe and professional working must be observed. The drive must only be assembled and commissioned by trained and instructed persons.

Installation and commissioning of the DAC<sub>eco</sub> must be carried out carefully by skilled workers so that the effects of interference that may cause a risk to the health of personnel and dangerous conditions are reduced to a minimum. Working on live parts and equipment is not permitted. Exceptions are governed by EN 50110.

Before removing covers, fitting additional attachments or accessories, e.g. reference value transmitters, photo sensors etc., the control unit must be switched off, disconnected from the mains and you must wait until the machine has come to a standstill [DIN VDE 0113 Part 301; EN 60204-3-1; IEC 204-3-1].

To reduce the risk of burns, fire, electric shock or injuries, alterations or modifications to the DAC<sub>eco</sub> are strictly forbidden.

No covers or protective devices may be removed during operation. Before leaving the work place, the machine's on/off switch must be switched to the off position. If it is to be idle for long periods, the power plug must be removed so that the drive cannot be switched on accidentally.

If additional attachments or equipment are connected to the DAC<sub>eco</sub> control unit, these may only be operated at low voltage that is produced by a safety transformer.

Do not put your hands near moving parts.

Do not operate the DAC<sub>eco</sub> if aerosols (sprays) or oxygen are being used.

These operating instructions are a component part of the DAC<sub>eco</sub> and must be passed on to any subsequent owners.

The instructions in the following sections are for your safety.



This symbol is a warning notice on the DAC<sub>eco</sub>. It indicates life threatening voltages.

**Caution** - In the event of a malfunction, there may be life threatening voltages in this area even after the electricity has been switched off (undischarged condensers).



The DAC<sub>eco</sub> must only be operated with a protective earthing conductor in a working protective earthing conductor system that complies with all local regulations and decrees.

The DAC<sub>eco</sub> control unit is not an independently operating unit and is intended for installation in other machines. Commissioning is not allowed until it has been ascertained that the machine in which the control unit is to be installed complies with the provisions of the EU Directive.

## **2 Scope of Delivery**

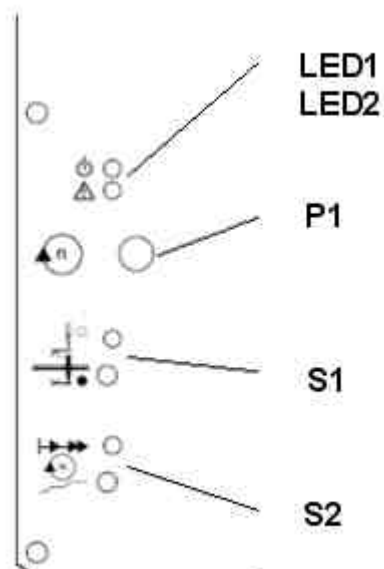
- 1x control unit with power switch
- 1x reference value transmitter
- 1x foot pedal connecting rod
- 1x operating instructions
- 1x machine identification memory (Mach ID)

### **2.1 Special accessories**

- 1x Synchronous motor with commutation or position transmitter
- 1x Under-table fitting unit with belt guard
- 1x External position transmitter or index signal
- 1x Memory dongle

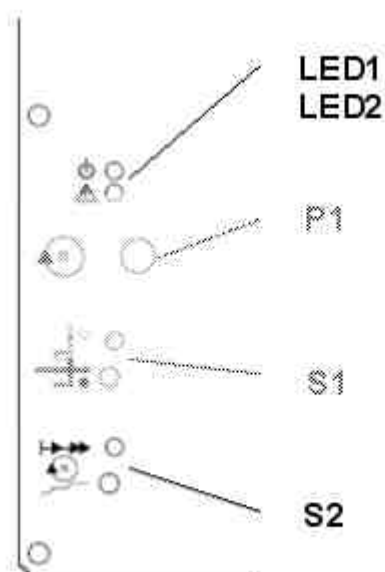
### 3 User settings

User settings of the  $DAC_{eco}$  can be set directly on the control unit. There are two buttons and a potentiometer available for this.



#### 3.1 Soft start

The **soft start** function can be turned on and off with S2. If the function is turned on, the corresponding LED is lit. The last setting is saved when switching of the control unit and is available at the next start.

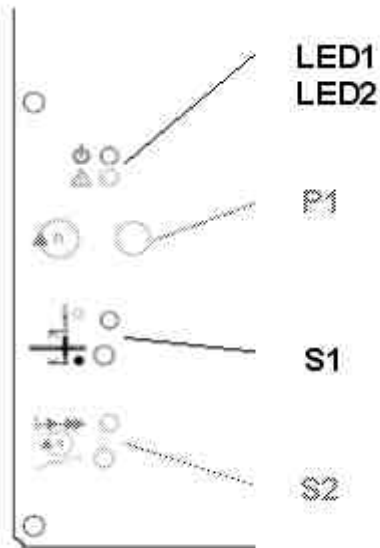


### 3.2 Stop position of the needle

Select the function **Stop position of the needle** with S1. If the stop position is set to "Needle up", the corresponding LED is lit.

Pressing the button changes the stop position of the needle.

The last setting is saved when switching of the control unit and is available at the next start.

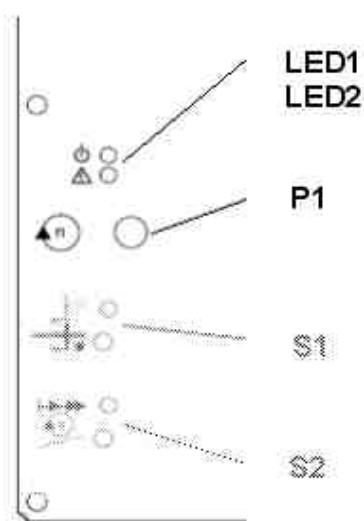


### 3.3 Reducing the speed

The speed can be adjusted to the current sewing process with the potentiometer. The basis is the maximum speed listed for the machine class; reduce the speed starting at that point.

The set value remains until the operator adjusts the potentiometer.

The last setting is saved when switching of the control unit and is available at the next start.





## 4 Technical information

### 4.1 Technical specifications

#### Rated values:

Voltage	$(U_N)$ [V]	230, mono-phase
Frequency	$(f_N)$ [Hz]	50/60
Current (control unit)	$[A]$	1.6
Power (output)	$(P_2)$ [W]	375
Speed	$(n_n)$ [1/min]	4000
Torque	$(M_n)$ [Nm]	0.63
Motor moment of inertia (without strap disc)	$(J_{mot})$ [kgcm <sup>2</sup> ]	0.5
Operating mode	S5 (40% ED at $t_s = 2.5$ s) Intermittent service with electrical braking, relative power-on time 40%, run time 2.5 s	

Type of protection

IP40

Insulation class

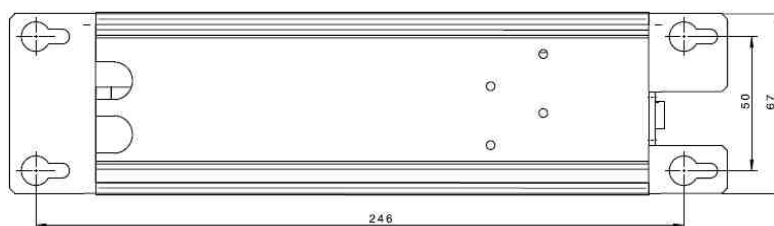
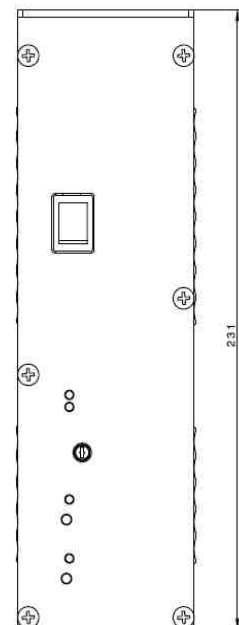
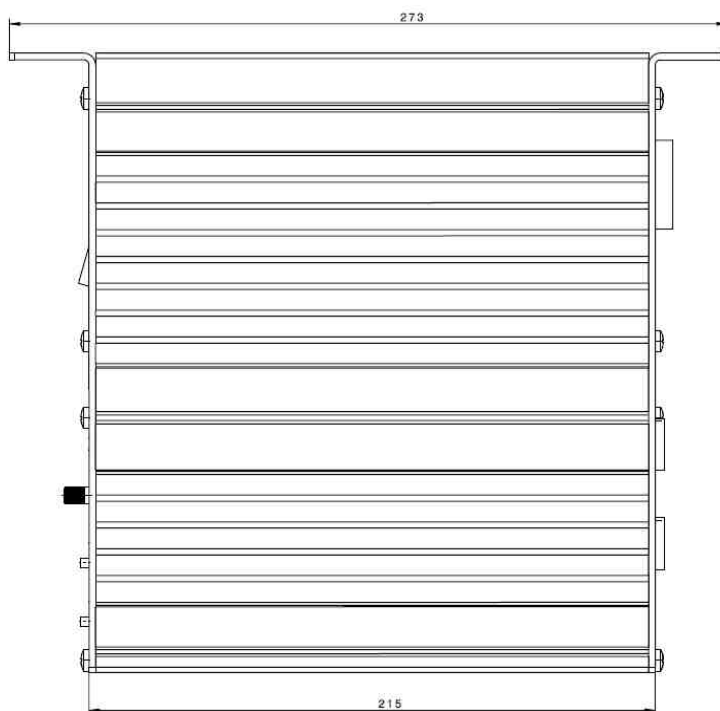
E

#### Limits:

Rated voltage range	[V]	190 - 240 + 20%/- 10% mono-phase
Speed	$(n_{max})$ [1/min]	6000
Torque	$(M_{max, \text{ short-term}})$ [Nm]	5
Power	$(P2_{max, \text{ short-term}})$ [W]	1500
Moment of inertia of the machine, reduced to the motor shaft	$(J_{masch})$ [kg cm <sup>2</sup> ]	4.5

#### Operating conditions:

Ambient temperature	[°C]	+ 5 - 45
Ambient temperature (average over 24h)	[°C]	< 35
Humidity (relative)		85% at 30 °C

**Control unit dimensions**

## 4.2 Intended use

The DAC<sub>eco</sub> is **not a** motor drive (control unit) that can be used on its own. The control unit is intended to be fitted into other machines, i.e. sewing units and sewing equipment in the sewing thread processing industry and trade.

Dry and clean areas must be provided to use the DAC<sub>eco</sub>.

Use in wet, dusty or hazardous explosive environments is an infringement of the specified use.

Use for the intended purpose includes observing the manufacturer's prescribed conditions for operation, maintenance and repair.

## 5 Assembly instructions

Before starting assembly, it is advisable to remove all parts from the packaging. The box contains the motor, the control unit, the accessories and the operating instructions. Check the contents of the packaging to make sure that everything is there. If you have any questions about assembly that the operating instructions do not answer, please contact us or one of our service workshops. Assemble the motor in accordance with the individual instructions and illustrations.

### 5.1 Fitting the reference value transmitter

- The reference value transmitter is fastened under the machine table with an assembly bracket.
- The reference value transmitter's pull and push rod are connected to the machine pedal by a connecting rod.
- Screw the assembly bracket for the reference value transmitter under the machine table so that the reference value transmitter's push and pull rod and the pedal connecting rod form as straight a line as possible in order to ensure the best transfer of power between the reference value transmitter and the pedal.
- The connecting rod and the pedal should form an angle as close to 90° as possible.
- Make sure that the pedal moves freely.

## 5.2 Power supply (mains connection)

Working on the electrical equipment (connection, maintenance, repairs) must only be done by or under the supervision of a qualified electrician.

The DAC<sub>eco</sub> control unit is intended to be connected to an **earthed alternating current network** with a rated voltage in the range of **180V - 260 V 50/60 Hz**.

**Before connecting the mains lead, make sure that the rated voltage is within the rated voltage range specified on the DAC<sub>eco</sub> rating plate.**

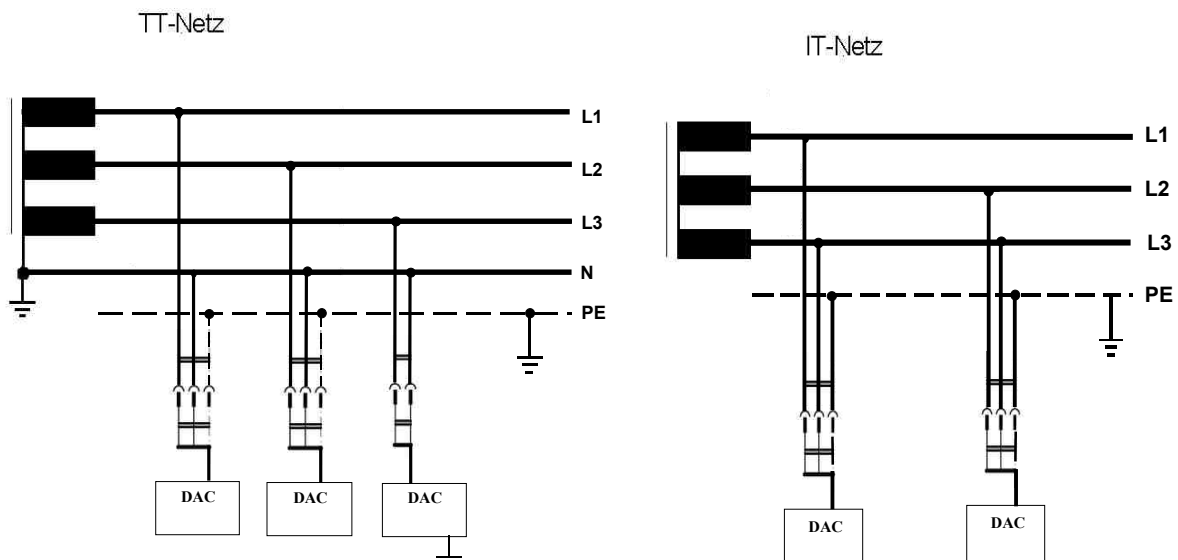
It must only be connected using a multi-pin plug with an earthing contact.

A fixed connection is not permitted. The following potentials must be connected:

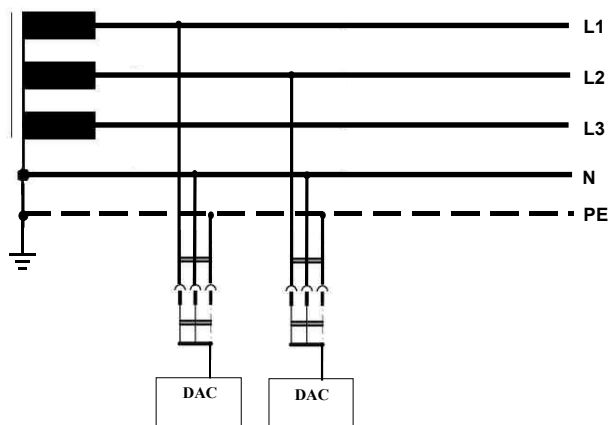
Phase	(L1 or L2 or L3)
Neutral cable	(N)
Protective earth	(PE)

The DAC basic control unit is suitable for connection to the following mains:

- **TN** mains with a directly earthed point, with a protective earth (PE) that is connected to this point.
- **TT** mains with a directly earthed point where the protective earth (PE) is not connected to this mains earthing point
- **IT** mains that is not directly earthed.



TN-Netz

**The following applies to TT mains and IT mains:**

All units protected jointly by one protective device must be connected to the same earthing device by a protective earth.

Simultaneously exposed units must be connected to a joint earth.

**The following applies additionally to IT mains:**

No active conductor of the unit must be earthed directly. The units must be connected individually, in groups or in their entirety to a protective earth.

Mono-phase plug connection

### 5.3 Electromagnetic compatibility (EMC)

The DAC<sub>eco</sub> is prepared for installing in or attaching to sewing units and sewing equipment and meets the relevant EMC regulations required for this (CDV IEC 204-3-1 44 sec 169) with a cable length of up to 500 mm on each input or output socket. From experience, this is sufficient for sewing units. With sewing equipment, further measures may be necessary because of longer cables, bad cabling, strong adjacent interference fields etc. The effect of interference can be reduced or eliminated by doing the following:

- Via suitable filters, delay units, suitable cables and cable runs.
- Run cables of different electrical circuits (mains voltage, low voltage) physically separate from each other in order to keep interference low.
- Reference potential wires for the electrical circuits or joint connection point: star-shaped wiring with one or more reference points that are earthed with large cross-section insulated wires
- Electrically conductive parts of the sewing unit or sewing equipment must be connected to the protective earth on the DAC<sub>eco</sub> housing via voltage equalising cables. (Cables suitable for high

frequency:

extra-fine stranded wires with a cross section of at least 2.5 mm<sup>2</sup> or wide copper bands.) When connecting the potential equaliser, make sure of secure contact, i.e. on painted parts. the connection must be made using toothed washers.

The following parts must be included in the potential equalisation:

- Sewing machine
- Sewing machine support frame
- Pedal
- Magnet or magnetic valve housings
- Holder for buttons
- Support frames for stackers, tape feed etc.
- Earth connections

Earth connections must be run from each part of the equipment to a common point. Braided, large cross-section wires must be used between moving parts and the housing and the earth connection must be kept as short as possible.

- Signal transfer

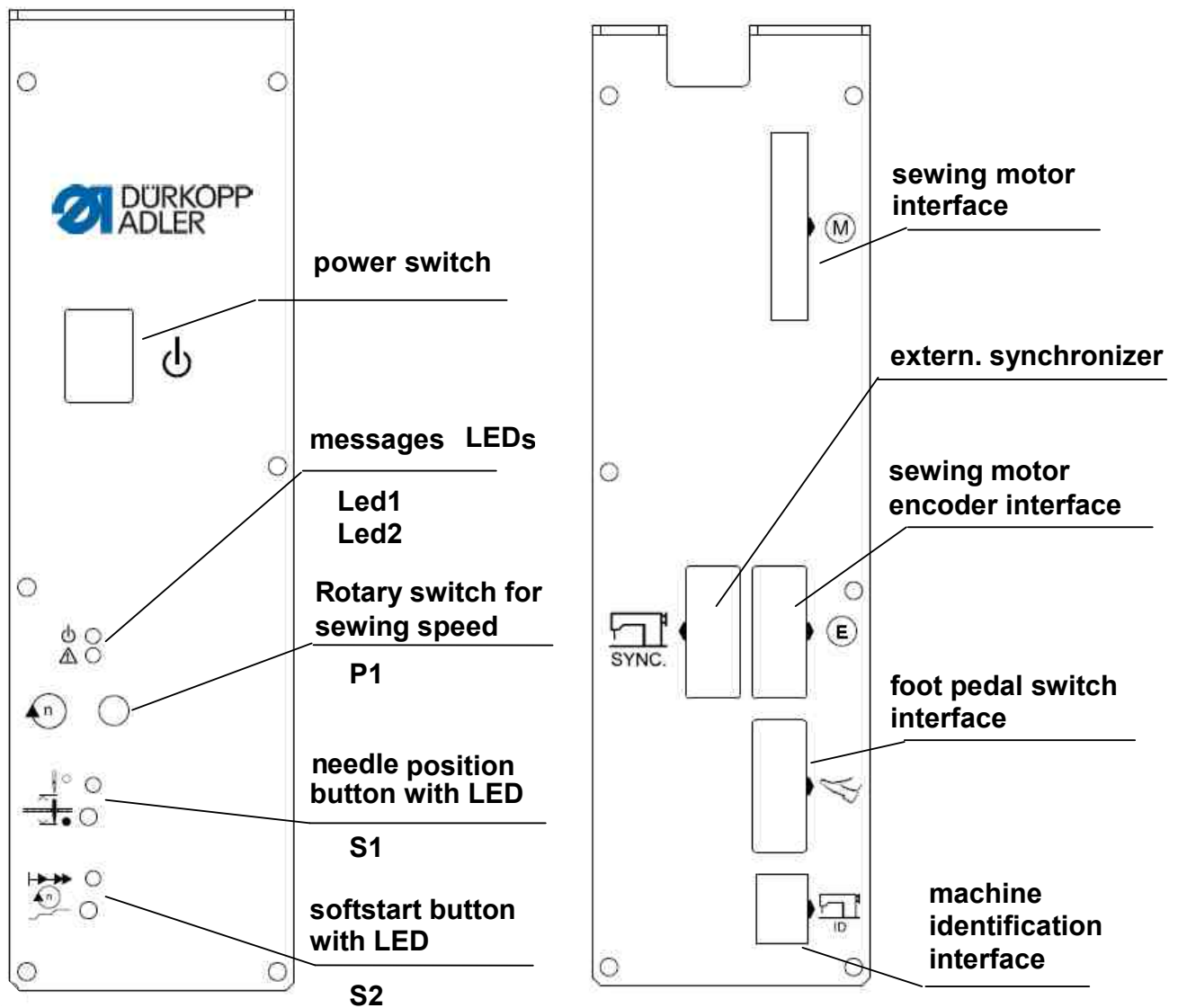
Make sure that no interference voltage is transferred from the control and main current cables to signal cables by using electrostatic and magnetic shielding, twisted wires and the cable run. (A cable crossover at right angles is better than one with a smaller angle. Parallel runs must definitely be avoided.)

- Separating equipment parts

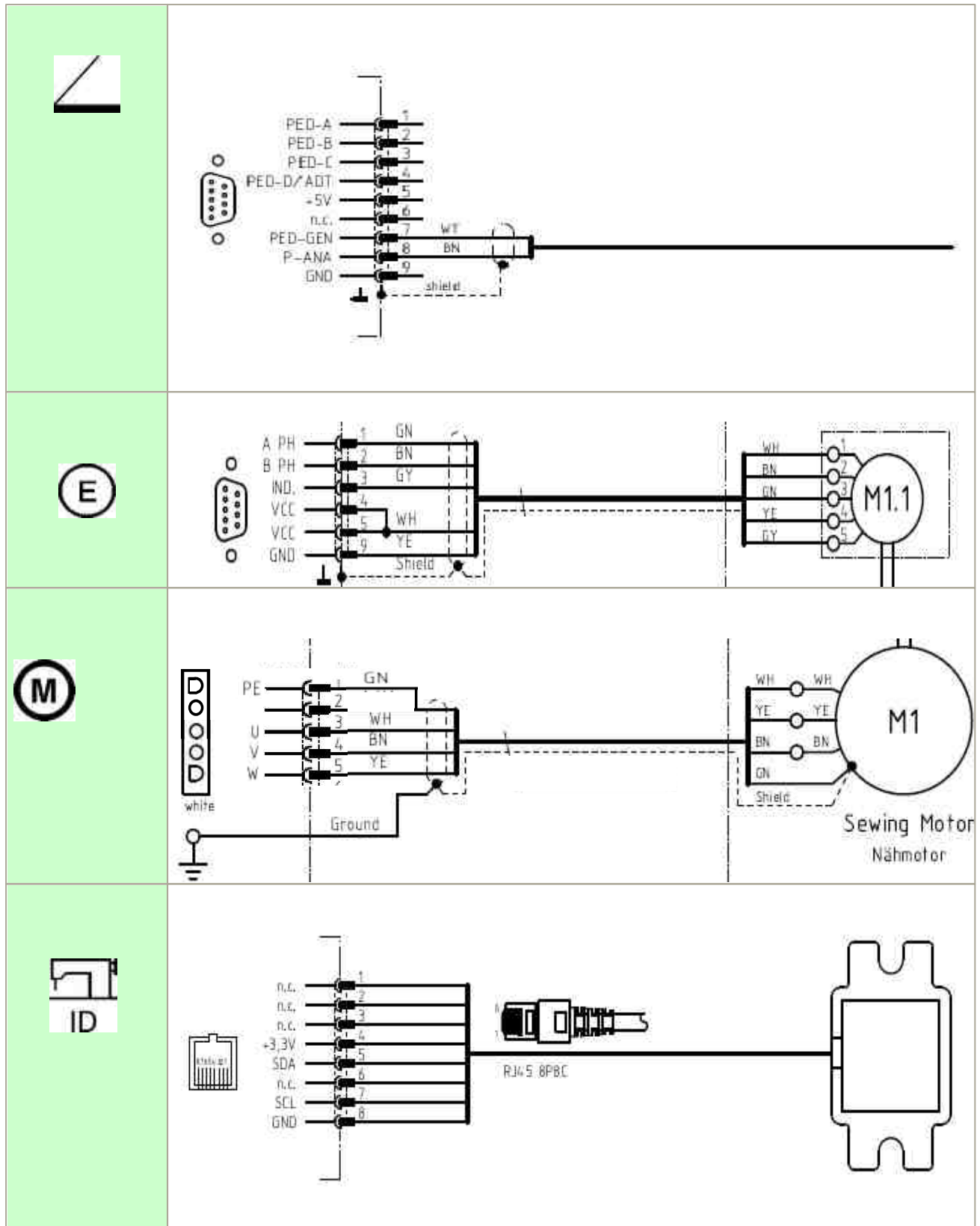
Equipment parts susceptible to interference (components with pulse processing and/or with low levels) should be separated and/or shielded from switch equipment such as electromagnetic relays, thyristors etc.

- In spite of the fact that it is not susceptible to interference, the DAC<sub>eco</sub> must not be operated in the immediate vicinity of HF welding machines or similar equipment in order to avoid malfunctions. Should problems occur, please contact the manufacturer.

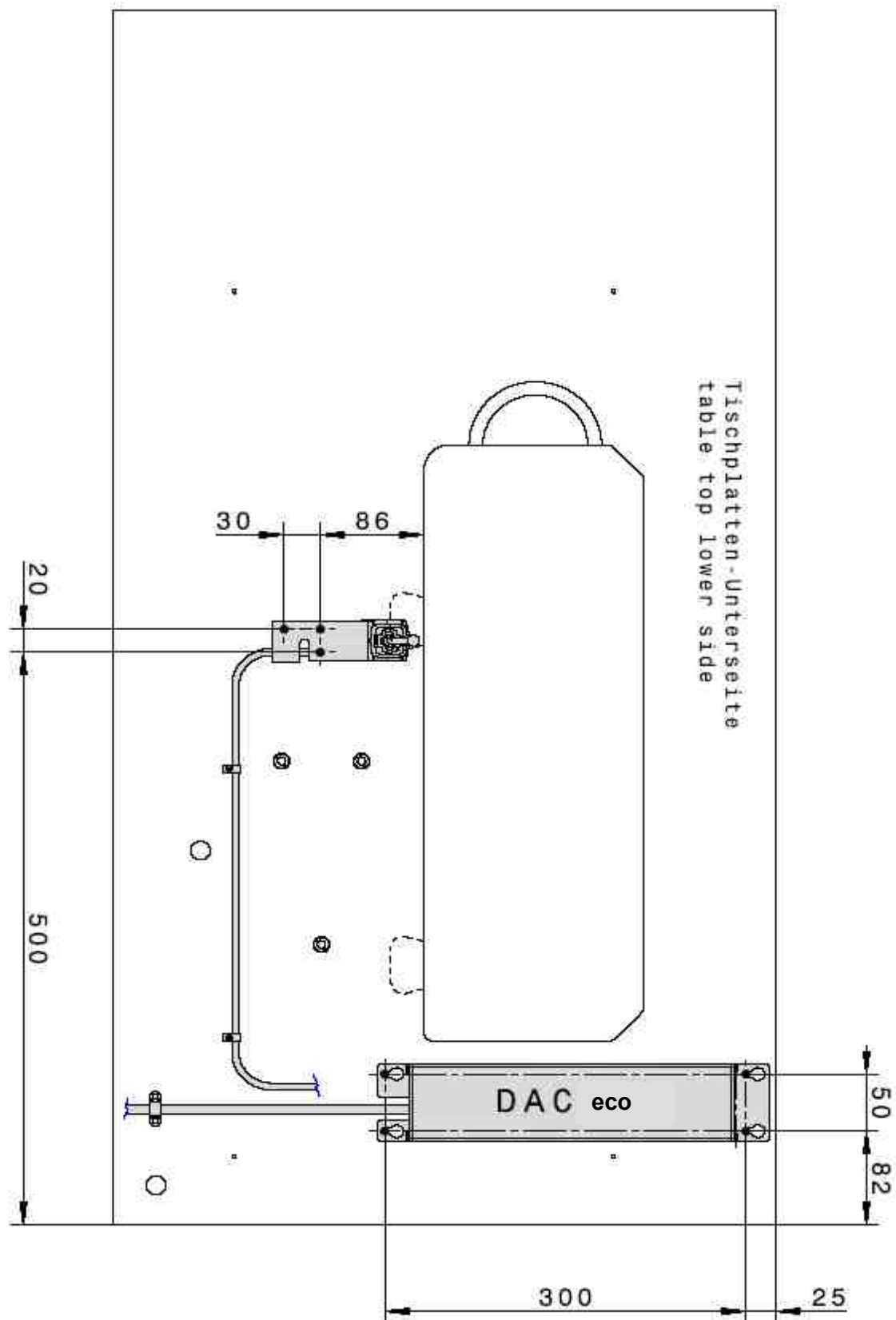
## 5.4 Wiring diagram







### 5.5 Example of fitting the DAC basic on a table top



## **5.6 Attaching the motor**

There are three ways of attaching the motor to the sewing machine

1. Attaching directly to the top of the sewing machine
2. Attaching under the machine table
3. Installing in the top of the sewing machine

There are three different ways of transferring the drive torque from the motor to the machine

Options:

- Toothed belts and toothed belt discs
- V-belts and V-belt discs
- direct axial connection of the motor to the machine's main shaft

### **5.6.1 Using toothed or V-belts**

When using toothed belts, the torque is transferred from the motor to the machine without slippage. The transmission ratio between the motor and the machine is usually 1: 1. In this case, the machine requires no reference position signal. Variable transmission ratios are possible depending on the ratio of the strap disk to the hand wheel. However, in this case the machine requires a reference position signal.

When using V-belts, the torque is not transferred from the motor to the machine without slippage. The transmission ratio between the motor and the machine is variable here. Here the machine requires a reference position signal.

### **5.6.2 Attaching the motor under the table**

The following parts are needed:

- Bracket to hold the motor
- V-belt disc for the motor shaft
- V-belt disc for the machine shaft
- V-belt
- Belt guard
- Synchroniser if necessary

## 6 Commissioning

**Before commissioning the control unit, the following must be ensured, checked or set:**

The correct assembly of the drive, position sensor and any accessories used

If necessary, the correct setting of the motor rotation direction

The correct maximum speed that is compatible with the sewing machine

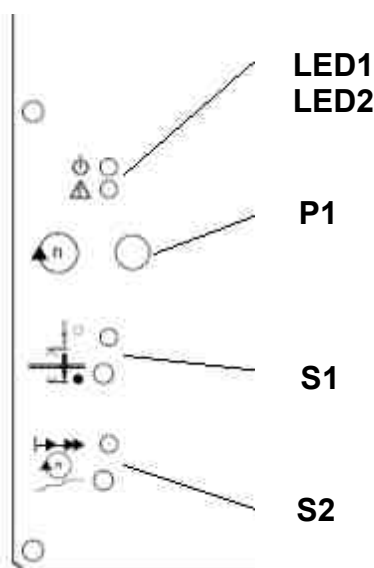
The position settings

The settings of the remaining relevant parameters

Saving the set values

## 7 Setting the basic functions

With S1 and S2, the  $DAC_{eco}$  can be programmed to a lesser degree.



There are six parameters listed in the table that can be changed.

	Parameter	Min	Max	Unit
1	Soft start stitches	1	20	Stitches
2	Soft start speed	200	1000	rpm
3	Maximum speed	200	6000	rpm
4	Holding force	0	6	A
5	Needle positions and reference position	-	-	-
6	Machine selection (DA dongle with parameter sets required)	-	-	-

To access the programming mode, keep S1 pressed when turning on the control unit.  
Once the programming mode is active and the corresponding parameter can be selected, LED2 flashes.

Buttons S1 and S2 have the following functions in programming mode:

- Confirmation - Keep S1 (OK) pressed (> one second)
- Cancellation - Keep S2 (ESC) pressed (> one second)
- Plus - Briefly press S1 (+) (< one second)
- Minus - Briefly press S2 (-) (< one second)

Select the corresponding parameter by briefly pressing S1.  
The LED allocated to S1 indicates the currently selected parameter.  
Confirm by keeping S1 pressed > one second.

Example: Briefly press S1 twice = programming the soft start speed. The corresponding LED repeatedly briefly flashes twice.

Confirm the selected parameter by keeping S1 pressed.

## 7.1 Number of stitches during soft start

If the programming level of a parameter is selected, buttons S1 and S2 have the following functions:

- Confirmation - Keep S1 (OK) pressed (> one second)
- Cancellation - Keep S2 (ESC) pressed (> one second)
- Plus - Briefly press S1 (+) (< one second)
- Minus - Briefly press S2 (-) (< one second)

Briefly pressing S1 increases the number of soft start stitches by one stitch; briefly pressing S2 reduces the number by one stitch.

The set value is then indicated by the flashing LEDs.

S1 LED : 10s digit

S2 LED : 1s digit

The LEDs flash every 0.5 seconds. After a pause of 1.5 seconds, the sequence is repeated until it is confirmed or cancelled.

Confirm the programmed result by pressing S1. Leave the programming level by pressing S2.

## 7.2 Speed

### 7.2.1 Set soft start speed

If the programming level of a parameter is selected, buttons S1 and S2 have the following functions:

- Confirmation - Keep S1 (OK) pressed (> one second)
- Cancellation - Keep S2 (ESC) pressed (> one second)
- Plus - Briefly press S1 (+) (< one second)
- Minus - Briefly press S2 (-) (< one second)

Briefly pressing S1 increases the soft start speed by 100rpm; briefly pressing S2 reduces it by 100rpm.

The set value is then indicated by the flashing LEDs.

S1 LED : 100s digit

The LEDs flash every 0.5 seconds. After a pause of 1.5 seconds, the sequence is repeated until it is confirmed or cancelled.

Confirm the programmed result by pressing S1. Leave the programming level by pressing S2.

### 7.2.2 Setting the maximum speed

If the programming level of a parameter is selected, buttons S1 and S2 have the following functions:

- Confirmation - Keep S1 (OK) pressed (> one second)
- Cancellation - Keep S2 (ESC) pressed (> one second)
- Plus - Briefly press S1 (+) (< one second)
- Minus - Briefly press S2 (-) (< one second)

Briefly pressing S1 increases the maximum speed by 100rpm; briefly pressing S2 reduces it by 100rpm.

The set value is then indicated by the flashing LEDs.

S1 LED : 1000s digit  
S2 LED : 100s digit

The LEDs flash every 0.5 seconds. After a pause of 1.5 seconds, the sequence is repeated until it is confirmed or cancelled.

Confirm the programmed result by pressing S1. Leave the programming level by pressing S2.

### 7.3 Holding force when idle

If the programming level of a parameter is selected, buttons S1 and S2 have the following functions:

- Confirmation - Keep S1 (OK) pressed (> one second)
- Cancellation - Keep S2 (ESC) pressed (> one second)
- Plus - Briefly press S1 (+) (< one second)
- Minus - Briefly press S2 (-) (< one second)

Briefly pressing S1 increases the holding force by 0.5 A; briefly pressing S2 reduces it by 0.5 A. The set value is then indicated by the flashing LEDs.

S1 LED : Pre-decimal position

S2 LED : Decimal place

The LEDs flash every 0.5 seconds. After a pause of 1.5 seconds, the sequence is repeated until it is confirmed or cancelled.

Confirm the programmed result by pressing S1. Leave the programming level by pressing S2.

This function prevents unwanted "wandering" of the needle when the machine has come to a standstill. The effect can be checked by turning the hand wheel.

- Holding force takes effect when idle
  - for a stop in the seam
  - after the end of the seam
- The effect can be adjusted
- The higher the set value, the stronger the holding force

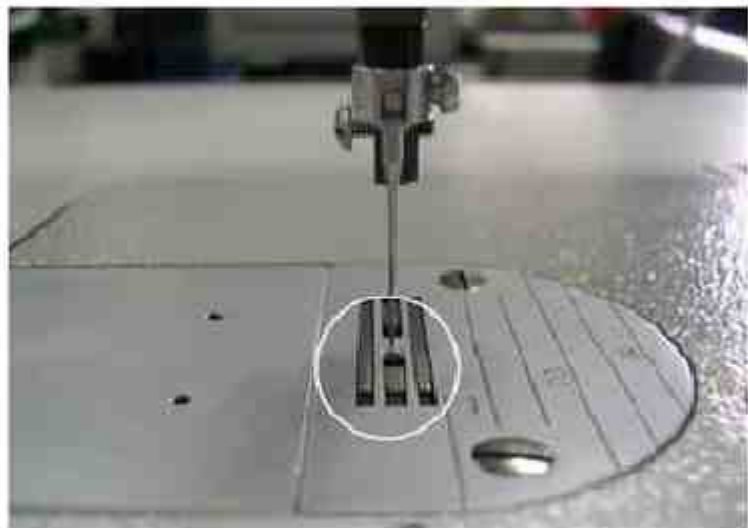
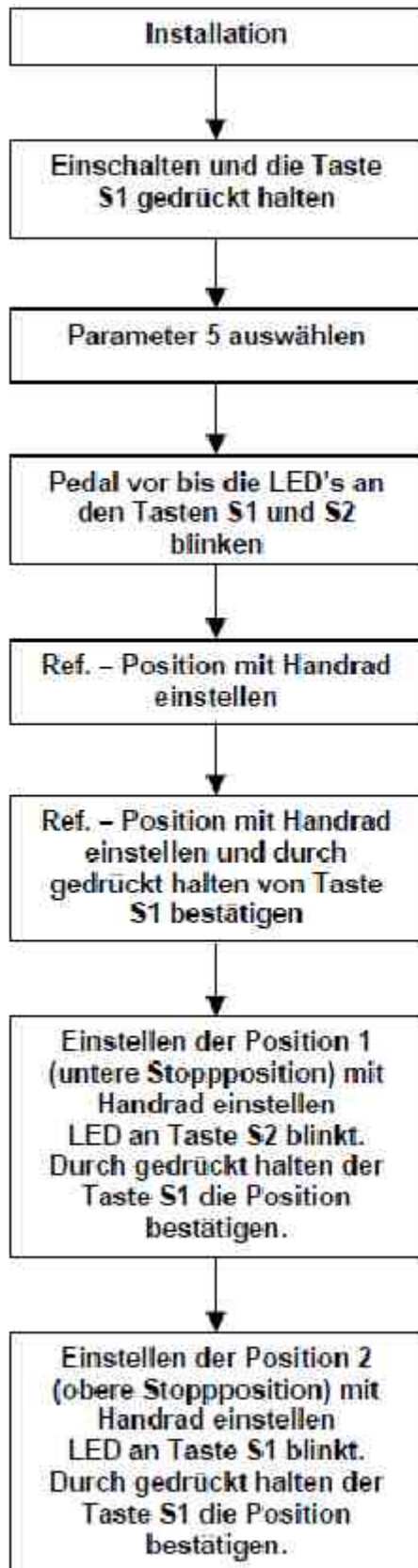
### 7.4 Setting the positions

The angle settings required on the machine, e.g. "Needle down" or "Thread lever up" are saved in the control unit. A reference position is required to establish a relationship between the position sensor information and the actual mechanical position. The reference position may be different depending on the parameter settings, normally "Point at which the needle penetrates the stitch plate (EP)"

**The reference position must be set:**

- on first commissioning
- after replacing the control unit
- after replacing the motor or the incremental sensor.





## 7.5 Machine selection

If the programming level of a parameter is selected, buttons S1 and S2 have the following functions:

- Cancellation - Keep S2 (ESC) pressed (> one second)
- Plus - Briefly press S1 (+) (< one second)
- Minus - Briefly press S2 (-) (< one second)

Select the next parameter set by briefly pressing S1. Select the previous parameter set by briefly pressing S2. The set value is then indicated by the flashing LEDs.

LED1 : 10s digit

LED2 : 1s digit

The LEDs flash every 0.5 seconds. After a pause of 1.5 seconds, the sequence is repeated until it is confirmed or cancelled.

Confirm the programmed result by pressing S1. Leave the programming level by pressing S2.

In order to load a new parameter set, insert a DA dongle with parameter sets in the pedal interface.

You can find this software on the homepage of Dürkopp Adler.

You can find a list with the machine classes in the additional txt-file.

### Example:

The following machine classes could select:

1. 171-131610
2. 173-141610
3. 271-140342-01
4. 272-140342-01
5. 281-140342-01
6. 838-x70522-M
7. 867-190x22-M
8. 867-190x42-M
9. 867-290x22-M
10. 867-290x42-M
11. 869-180x22-M
12. 887-1601x2-M
13. 888-x601x2-M
14. 888-x60522-M
15. 888-3561x2-M

You can change the selection with the upper and lower buttons.

The actual selected class will be shown by flashing of the LEDs.

### Example select class 281 – 140342-01:

Push 5 times the upper button.

The lower LED will flash 5 times and after this it has got a longer break. The cycle will be repeated

### Example select class 887-1601x2-M:

Push 12 times the upper button.

Die obere LED blinkt einmal für die Zehn und die untere LED blinkt zweimal für die 2.

The upper LED will flash one time for the ten and the lower LED will flash 2 times for the 2 after this both LEDs have got a longer break. The cycle will be repeated

To accept the selection push and hold the upper button for approx. 2 sec.

Now the parameters will be loaded and you can see it by flashing of the Message LED and you can hear a signal.

If the Message LED is flashing in a constant cycle and you can't hear any signal you can switch off the control.

Now connect the pedal with the control.

## 8 Update of the controle

You can update the controle software and the default parameter of the machine.

You need a memory dongle (9835 901005) with the controle software to update the controle.

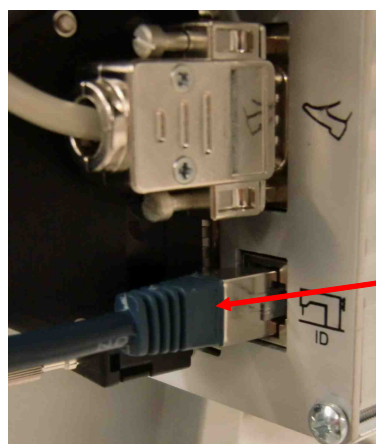
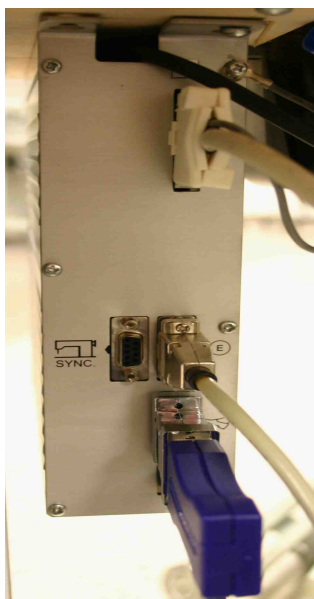
You can find the software on the homepage of Dürkopp Adler.

### 8.1 Update process

Connect all plugs of the machine head with the control. It is very important that the machine ID is connected with the control.

Der Speicher-Dongle mit der Steuerungssoftware muss an die Pedal-Schnittstelle angeschlossen werden.

Insert a DA-Dongle with the control software at the connector of the foot pedal.



Machine-ID

Switch on the control. Both LEDs will be flashing

That's means that the software will be updated. If the the update was successfully you can hear a signal and the lowest LED will be flashing. The LEDs (Power und Message) are activated.



## 9 Error, warning and information messages

The DAC<sub>eco</sub> control unit contains three groups of messages that are divided as follows:

Degree	Description
Error	Serious error Turn off the control unit and correct the error.
Warning	Eliminate the condition that caused the warning and the control unit will continue to work normally.
Information	Press OK You can continue to work; only emergency running properties may be available.

The messages are visualised via LED2. The coding is displayed via LED2 flashing every 0.5 seconds. The flashing sequence is then interrupted for two seconds and repeated.

Degree	Code	Error or information description	Remedial measures
Warning	1	Travel stop	- Check the tilt sensor on the machine
Information	2	Low voltage warning (1st threshold) (mains voltage < 180V AC)	- Check mains voltage - Stabilise mains voltage - Use generator
Warning	3	Pedal position is not in position 0	- When switching on the control unit, take foot off pedal
Error	4	Pedal not connected	- Connect analogue pedal
Error	5	Sewing motor encoder plug (Sub-D, 9-pin) not connected.	- Insert the encoder lead into the control unit. Use the correct interface.
Error	6	Motor stalls	- Eliminate sluggish movement in the sewing machine
Error	7	Sewing motor overload	- Eliminate sluggish movement in the sewing machine
Error	8	Sewing motor error Sewing motor plug (AMP) is not connected.	- Check the connection and if necessary plug in. - Test sewing motor phases (R= 2.8 Ohm, high-resistance compared with PE) - Replace sewing motor - Replace control unit
Error	9	Sewing motor insulation error	- Check motor phase and PE for low-resistance connection - Replace sewing motor
Error	10	High voltage error, mains voltage >290V for some time	- Check mains voltage, if rated voltage exceeded permanently - stabilise or use generator
Error	11	EEPROM communication error	- Check the connection of the Mach ID - Turn off the control unit, wait until LEDs are off, restart
Information	12	No valid data on external EEPROM	- Check the connection of the Mach ID - Turn off the control unit, wait until LEDs are off, restart - Update software
Error	13	Low voltage failure (2nd threshold) (mains voltage < 150V AC)	- Check mains voltage - Stabilise mains voltage - Use generator
Error	14	Sewing motor turning in the wrong direction	- Replace encoder - Check that the motor plug is in the correct place and change if necessary

Degree	Code	Error or information description	Remedial measures
			<ul style="list-style-type: none"> <li>- Check wiring in the machine distributor and change if necessary</li> <li>- Test motor phases and check for value</li> </ul>
Error	15	Excess sewing motor current, internal current increase >25A	<ul style="list-style-type: none"> <li>- Replace control unit</li> </ul>
Error	16	Maximum speed exceeded	<ul style="list-style-type: none"> <li>- Replace encoder</li> </ul>
Error	17	AC RDY time-out , intermediate circuit voltage has not reached the defined threshold in the given time.	<ul style="list-style-type: none"> <li>- Check mains voltage</li> <li>- If mains voltage OK, replace control unit</li> </ul>
Information	18	No valid data on internal and external EEPROM	<ul style="list-style-type: none"> <li>- Check the connection of the Mach ID</li> <li>- Turn off the control unit, wait until LEDs are off, restart</li> <li>- Update software</li> </ul>
Information	19	No valid data on internal EEPROM	<ul style="list-style-type: none"> <li>- Check the connection of the Mach ID</li> <li>- Turn off the control unit, wait until LEDs are off, restart</li> <li>- Update software</li> </ul>

